



Livnat Jerby

Assistant Professor of Genetics

Bio

BIO

Livnat Jerby is an Assistant Professor of Genetics at Stanford University. Her research focuses on multicellular dynamics, as a disease driver and therapeutic avenue, particularly in the context of cancer immunology. In her work, she aims to identify the drivers, molecular underpinnings, and causal structure of multifactorial immune evasion mechanisms, and use this information to identify new and more effective ways to augment and unleash targeted immunity via combinatorial interventions. To address this challenge at scale, she develops integrative approaches, fusing single-cell sequencing and imaging with machine learning, genetic and environmental perturbations.

Thus far, her research provided new perspectives to key facets of tumor biology, encompassing metabolism, genetics, and immunology. As a postdoctoral fellow at the Broad Institute of MIT and Harvard, she identified regulators of T cell exclusion and dysfunction with Levi Garraway and Aviv Regev. She holds a B.Sc. in Computer Science and Biology and obtained her PhD in 2016 from Tel Aviv University, where she worked with Eytan Ruppin and developed new ways to interrogate cancer metabolism and genetics.

This fall Livnat joined Stanford Genetics to establish a multidisciplinary lab that will harness machine learning in combination with clinical data and extensive functional testing to dissect and target immune dysregulation in cancer, aiming to leverage the versatile, interconnected, and non-linear function of genes, cells, and tissues for disease detection, prevention, and treatment.

Her research has been generously supported by the Schmidt Family Foundation, Rothschild Foundation, the Cancer Research Institute (CRI), the Burroughs Wellcome Fund (BWF), and Chan Zuckerberg Biohub initiative.

ACADEMIC APPOINTMENTS

- Assistant Professor, Genetics
- Member, Bio-X

HONORS AND AWARDS

- Investigator award, Chan Zuckerberg biohub (2020 - 2025)
- Career Awards at the Scientific Interface (CASI), Burroughs Wellcome Fund (BWF) (2019 - 2024)
- Postdoctoral training fellowship, Cancer Research Institute (CRI) (2016-2019)
- Postdoctoral award, Eric and Wendy Schmidt Foundation (2016-2017)
- Postdoctoral fellowship, Rothschild, Yad Hanadiv (2015-2016)

PATENTS

- Aviv Regev, Pratiksha Thakore, John Doench, JT Neal, Jesse Boehm, Oana Ursu, Livnat Jerby-Arnon. "United States Patent 16/809,458 Methods and Compositions for Massively Parallel Variant and Small Molecule Phenotyping"
- Aviv Regev, Livnat Jerby-Arnon, Ana Anderson, Katherine Tooley, Vijay K. Kuchroo. "United States Patent 17/083,235 Pan-Cancer T Cell Exhaustion Genes"
- A. Regev, O. Rozenblatt-Rosen, B. Izar, and L. Jerby. "United States Patent PCT/US2018/054020 and PCT/US2018/025507 Methods and compositions for detecting and modulating an immunotherapy resistance gene signature in cancer"
- Livnat Jerby, A. Regev, L. Jerby, M. Suva, N. Riggi. "United States Patent PCT/US2020/022466 Detection means, Compositions and Methods for Modulating Synovial Sarcoma Cells"

LINKS

- Lab website: <http://jerbylab.stanford.edu/>

Teaching

COURSES

2021-22

- Genomics: GENE 211 (Win)

2020-21

- Cancer Biology Journal Club: CBIO 280 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Ann Lin, Jarod Rutledge

Postdoctoral Faculty Sponsor

Vishnu Priya Kanakaveti, Youngmin Kim, Jeehyun Yoe

Doctoral Dissertation Advisor (AC)

Kevin Aguirre, Reece Akana

Doctoral Dissertation Co-Advisor (AC)

Christine Yiwen Yeh

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Genetics (Phd Program)

Publications

PUBLICATIONS

- **Opposing immune and genetic mechanisms shape oncogenic programs in synovial sarcoma.** *Nature medicine*
Jerby-Arnon, L. n., Neftel, C. n., Shore, M. E., Weisman, H. R., Mathewson, N. D., McBride, M. J., Haas, B. n., Izar, B. n., Volorio, A. n., Boulay, G. n., Cironi, L. n., Richman, A. R., Broye, et al
2021
- **A Cancer Cell Program Promotes T Cell Exclusion and Resistance to Checkpoint Blockade.** *Cell*
Jerby-Arnon, L. n., Shah, P. n., Cuoco, M. S., Rodman, C. n., Su, M. J., Melms, J. C., Leeson, R. n., Kanodia, A. n., Mei, S. n., Lin, J. R., Wang, S. n., Rabasha, B. n., Liu, et al
2018; 175 (4): 984–97.e24
- **Predicting Cancer-Specific Vulnerability via Data-Driven Detection of Synthetic Lethality** *CELL*

- Jerby-Arnon, L., Pfetzer, N., Waldman, Y. Y., McGarry, L., James, D., Shanks, E., Seashore-Ludlow, B., Weinstock, A., Geiger, T., Clemons, P. A., Gottlieb, E., Ruppin, E.
2014; 158 (5): 1199–1209
- **Inter-cellular CRISPR screens reveal regulators of cancer cell phagocytosis.** *Nature*
Kamber, R. A., Nishiga, Y., Morton, B., Banuelos, A. M., Barkal, A. A., Vences-Catalan, F., Gu, M., Fernandez, D., Seoane, J. A., Yao, D., Liu, K., Lin, S., Spees, et al
2021
 - **Multimodal pooled Perturb-CITE-seq screens in patient models define mechanisms of cancer immune evasion** *NATURE GENETICS*
Frangieh, C. J., Melms, J. C., Thakore, P. I., Geiger-Schuller, K. R., Ho, P., Luoma, A. M., Cleary, B., Jerby-Arnon, L., Malu, S., Cuoco, M. S., Zhao, M., Ager, C. R., Rogava, et al
2021: 332–41
 - **Serine biosynthesis is a metabolic vulnerability in IDH2-driven breast cancer progression.** *Cancer research*
Barnabas, G. D., Sang Lee, J. n., Shami, T. n., Harel, M. n., Beck, L. n., Selitrennik, M. n., Jerby-Arnon, L. n., Erez, N. n., Ruppin, E. n., Geiger, T. n.
2021
 - **Inhibitory CD161 receptor identified in glioma-infiltrating T cells by single-cell analysis.** *Cell*
Mathewson, N. D., Ashenberg, O. n., Tirosh, I. n., Gritsch, S. n., Perez, E. M., Marx, S. n., Jerby-Arnon, L. n., Chanoch-Myers, R. n., Hara, T. n., Richman, A. R., Ito, Y. n., Pyrdol, J. n., Friedrich, et al
2021
 - **A single-cell landscape of high-grade serous ovarian cancer** *NATURE MEDICINE*
Izar, B., Tirosh, I., Stover, E. H., Wakiro, I., Cuoco, M. S., Alter, I., Rodman, C., Leeson, R., Su, M., Shah, P., Iwanicki, M., Walker, S. R., Kanodia, et al
2020; 26 (8): 1271–+
 - **A single-cell and single-nucleus RNA-Seq toolbox for fresh and frozen human tumors** *NATURE MEDICINE*
Slyper, M., Porter, C. M., Ashenberg, O., Waldman, J., Drokhlyansky, E., Wakiro, I., Smillie, C., Smith-Rosario, G., Wu, J., Dionne, D., Vigneau, S., Jane-Valbuena, J., Tickle, et al
2020; 26 (5): 792–+
 - **A Distinct Transcriptional Program in Human CAR T Cells Bearing the 4-1BB Signaling Domain Revealed by scRNA-Seq.** *Molecular therapy : the journal of the American Society of Gene Therapy*
Boroughs, A. C., Larson, R. C., Marjanovic, N. D., Gosik, K. n., Castano, A. P., Porter, C. B., Lorrey, S. J., Ashenberg, O. n., Jerby, L. n., Hofree, M. n., Smith-Rosario, G. n., Morris, R. n., Gould, et al
2020; 28 (12): 2577–92
 - **Integrative molecular and clinical modeling of clinical outcomes to PD1 blockade in patients with metastatic melanoma** *NATURE MEDICINE*
Liu, D., Schilling, B., Liu, D., Sucker, A., Livingstone, E., Jerby-Arnon, L., Zimmer, L., Gutzmer, R., Satzger, I., Loquai, C., Grabbe, S., Vokes, N., Margolis, et al
2019; 25 (12): 1916–+
 - **Genome-wide prediction of synthetic rescue mediators of resistance to targeted and immunotherapy** *MOLECULAR SYSTEMS BIOLOGY*
Das Sahu, A., Lee, J. S., Wang, Z., Zhang, G., Iglesias-Bartolome, R., Tian, T., We, Z., Miao, B., Nair, N., Ponomarova, O., Friedman, A. A., Amzallag, A., Moll, et al
2019; 15 (3): e8323
 - **IL-33 Signaling Alters Regulatory T Cell Diversity in Support of Tumor Development.** *Cell reports*
Li, A. n., Herbst, R. H., Canner, D. n., Schenkel, J. M., Smith, O. C., Kim, J. Y., Hillman, M. n., Bhutkar, A. n., Cuoco, M. S., Rappazzo, C. G., Rogers, P. n., Dang, C. n., Jerby-Arnon, et al
2019; 29 (10): 2998–3008.e8
 - **Harnessing synthetic lethality to predict the response to cancer treatment** *NATURE COMMUNICATIONS*
Lee, J., Das, A., Jerby-Arnon, L., Arafeh, R., Auslander, N., Davidson, M., McGarry, L., James, D., Amzallag, A., Park, S., Cheng, K., Robinson, W., Atias, et al
2018; 9: 2546
 - **Perturb-Seq: Dissecting Molecular Circuits with Scalable Single-Cell RNA Profiling of Pooled Genetic Screens** *CELL*
Dixit, A., Pamas, O., Li, B., Chen, J., Fulco, C. P., Jerby-Arnon, L., Marjanovic, N. D., Dionne, D., Burks, T., Raychowdhury, R., Adamson, B., Norman, T. M., Lander, et al
2016; 167 (7): 1853–+

- **Genome-scale study reveals reduced metabolic adaptability in patients with non-alcoholic fatty liver disease** *NATURE COMMUNICATIONS*
Hyotylainen, T., Jerby, L., Petaja, E. M., Mattila, I., Jantti, S., Auvinen, P., Gastaldelli, A., Yki-Jarvinen, H., Ruppin, E., Oresic, M.
2016; 7: 8994
- **Fumarate induces redox-dependent senescence by modifying glutathione metabolism** *NATURE COMMUNICATIONS*
Zheng, L., Cardaci, S., Jerby, L., MacKenzie, E. D., Sciacovelli, M., Johnson, T., Gaude, E., King, A., Leach, J. G., Edrada-Ebel, R., Hedley, A., Morrice, N. A., Kalna, et al
2015; 6: 6001
- **Moving ahead on harnessing synthetic lethality to fight cancer** *MOLECULAR & CELLULAR ONCOLOGY*
Jerby-Arnon, L., Ruppin, E.
2015; 2 (2): e977150
- **Metabolic Associations of Reduced Proliferation and Oxidative Stress in Advanced Breast Cancer** *CANCER RESEARCH*
Jerby, L., Wolf, L., Denkert, C., Stein, G. Y., Hilvo, M., Oresic, M., Geiger, T., Ruppin, E.
2012; 72 (22): 5712–20
- **Predicting Drug Targets and Biomarkers of Cancer via Genome-Scale Metabolic Modeling** *CLINICAL CANCER RESEARCH*
Jerby, L., Ruppin, E.
2012; 18 (20): 5572–84
- **Haem oxygenase is synthetically lethal with the tumour suppressor fumarate hydratase** *NATURE*
Frezza, C., Zheng, L., Folger, O., Rajagopalan, K. N., MacKenzie, E. D., Jerby, L., Micaroni, M., Chaneton, B., Adam, J., Hedley, A., Kalna, G., Tomlinson, I. M., Pollard, et al
2011; 477 (7363): 225–U132
- **Predicting selective drug targets in cancer through metabolic networks** *MOLECULAR SYSTEMS BIOLOGY*
Folger, O., Jerby, L., Frezza, C., Gottlieb, E., Ruppin, E., Shlomi, T.
2011; 7: 501
- **Computational reconstruction of tissue-specific metabolic models: application to human liver metabolism** *MOLECULAR SYSTEMS BIOLOGY*
Jerby, L., Shlomi, T., Ruppin, E.
2010; 6: 401